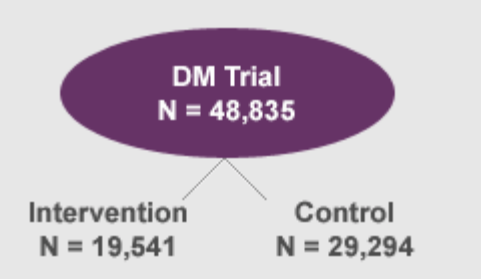
WHI Dietary Modification Trial Overview

Overview

The WHI Dietary Modification Trial (DM) of the WHI was a randomized controlled clinical trial designed to test the hypothesis that a low-fat dietary pattern compared to a usual dietary pattern would reduce the risk of breast and colorectal cancers and coronary heart disease in postmenopausal women. In total, 48,835 women 50-79 years of age at baseline participated in the WHI DM Trial.



Background

Prior to the WHI DM Trial, data from international ecologic studies showed that, in postmenopausal women, the rates of breast and colorectal cancers increased significantly as dietary fat increased. Migration studies supported the ecological findings, although case-control and observational studies tended to show equivocal results. Additionally, for colorectal cancer, inverse relationships were seen between colorectal cancer risk and dietary fiber. For coronary heart disease (CHD), there was already a well documented literature showing a positive relationship between saturated fat intake and serum low density lipoprotein (LDL) levels, although the effect of lowering saturated fat on CHD itself had not been studied in postmenopausal women.

Screening and Eligibility

In addition to the general Clinical Trials exclusion criteria, the primary DM trial exclusion criterion was based on usual diet. Women consuming less than 32% calories from fat as estimated by a food frequency questionnaire were excluded. This criterion was designed to exclude about 4% of screened women and thus potentiate a higher difference in fat intake between intervention and controls post-intervention. Other DM trial specific eligibility criteria were focused on adherence and retention: unable to complete a food record, type 1 diabetes mellitus, or 10 or more meals per week eaten away from home. A complete listing of DM Trial-specific exclusion criteria are presented in the DM baseline monograph.

Intervention

The WHI DM Trial included two arms: a control (60%) and intervention (40%). The imbalanced randomization was set to reduce the higher staff and materials costs associated with implementing the intervention while maintaining statistical power for testing the hypotheses.

Control arm (Usual Diet or Comparison group)

Sixty percent of the women (n=29,294) were randomized to the control arm. These women were not asked to make any dietary changes. At randomization they were given a copy of the Dietary Guidelines for Americans for general nutrition information.

Intervention arm (Dietary Change group)

Forty percent of the women were randomized to the intervention arm (n=19,541). These women were asked to lower their fat intake to 20% of energy, increase fruit/vegetable servings to five or more daily, and increase grain servings to six or more daily. Decreasing saturated fat to 7% of total energy was a protocol goal that was expected to be achieved through reduction of total fat without giving participants a target goal. The intervention did not include a weight loss component, though on average, women did lose a modest amount of weight.

Individualized Fat Gram Goal

Each woman received an individualized daily fat gram goal set to approximate 20% energy from fat after adopting the low-fat dietary pattern. Goals ranged from 27-39 grams of fat, depending on a woman's expected total energy intake. In September 1995, the algorithm for calculating the individualized fat gram goals was revised based on early WHI dietary assessment data. The revision called for lowering the fat

gram goals to more closely approximate 20% energy from fat. The revised algorithm, based on a participant's height and intake of 15% energy from fat, was applied to offset possible underestimates of self-monitoring. Participants randomized after September 1995 received goals based on the revised algorithm. Participants randomized before September 1995 kept their original goals, which ranged from 23-27 grams of fat.

Group Sessions

Groups of 8-15 participants attended nutritionist-facilitated sessions to learn how to lower their dietary fat intake and increase their fruit and vegetable and grain intake. They also learned how to maintain the changes. During the first year, participants attended 18 group sessions plus one individual session with a nutritionist. The individualized fat gram goals were introduced at session #2. The fruit/vegetable and grain goals were introduced at session #7. After the first year, participants attended quarterly maintenance sessions facilitated by nutritionists. Women also had the opportunity to participate in optional peer-led group meetings.

Self-monitoring

Women were asked to self-monitor their food intake throughout the study. They received a WHI Fat Counter book listing fat grams and fruit/vegetable and grain serving equivalents for about 1,000 foods. They also received a choice of self-monitoring tools for recording their intakes. Choices included a Food Diary similar to the detailed 4-day food record, a quicker Fat Scan where commonly eaten foods were listed for easier tallying, and a variety of alternatives to meet participant needs. During the first year, for each of the sessions 1-10, which occurred weekly or every two weeks, one 3-day score was requested. For sessions 11-18, when sessions changed to a monthly frequency, two 3-day records were requested. In total, 17 3-day fat records and 11 3-day fruit/vegetable and grain records were requested during year 1. During maintenance, from year 2 forward when sessions occurred every three months, participants were asked to submit three 3-day records. Thus, during year 2 and beyond, twelve 3-day fat, fruit/vegetable, and grain records were requested annually.

Augmented Interventions

Four study-wide augmented interventions to enhance adherence were implemented between 1999 and 2004 in addition to the usual quarterly maintenance sessions. They included a motivational interviewing protocol (1999-2001), a targeted messaging campaign (2001), a computerized personalized evaluation of fat intake implemented during the group sessions (2002), and a mailed self-administered version of the computerized evaluation of fat intake (2003). In addition, Clinical Centers implemented augmented interventions that were locally targeted to their participants.

Adherence Monitoring and Dietary Assessment

Dietary adherence was assessed throughout the DM by self-report. The trial design called for an 13% difference in percent energy fat between the control and intervention groups (Control-Intervention; C-I) at year 1, decreasing to an 11% difference at the end of the study. At year 1, the self-reported Control-Intervention difference in % energy from fat was 10.9% and at year 5 it was 9.0%.

Food Frequency Questionnaire (FFQ)

Dietary adherence was monitored primarily by an FFQ developed for the WHI based on FFQs developed by the Nutrition Assessment Shared Resource of the Fred Hutchinson Cancer Research Center. The FFQ included 122 line items and 19 questions adjusting for type and amount of fat as well as types of breakfast cereals. In total, 350 distinct foods were represented. All women in the DM completed the FFQ at baseline and year 1. After year 1, a rotating sample of one-third of the women completed the FFQ each year.

Four-day food records and 24-hour recalls

A 6% cohort of DM participants provided detailed 4-day food records at baseline and year 1. At years 3, 6, and 9, dietary assessment of the cohort continued with two 24-hour recalls on nonconsecutive days replacing the 4-day food records.

Nutrient supplement intake survey

All DM participants provided nutrient supplement use information at baseline and years 1, 3, 6, and 9.

Nutrient data
A description of the nutrient variables from the dietary and supplement assessment instruments can be found in the Data and Documentation section..

Follow-up

Women in the WHI DM Trial were followed between December 1993 and March 2005, 8.1 years on average. During annual in-person follow-up contacts at the Clinical Centers, staff collected clinical measures, such as height and weight, and self-report measures, such as dietary intake, physical activity, personal habits, and psychosocial variables. All women provided blood specimens at baseline and year 1, although specimens were analyzed only for a 4.3% cohort. At years 3, 6, and 9, blood specimens were collected and analyzed only from the 4.3% cohort. The 4.3% cohort was nested within the 6% cohort of DM participants who provided 4-day food records and 24-hour recalls. Thus, WHI has blood analyte and nutrient intake data on a 4.3% cohort of DM participants at baseline and years 1, 3, 6, and 9. Mammogram reports, from the DM participant's personal health care provider, were collected every two years. Medical outcome information was collected from all DM participants at the annual in-person Clinical Center contacts. For participants who could not attend the annual contacts in person, mail or phone contacts were acceptable although clinical measures were then missed. Semi-annual contacts were conducted by visit, mail, or phone to collect medical outcome information.

Timeline
The first DM participant was randomized in December 1993 and the last one in August 1998. Intervention activities continued until September 31, 2004 at the planned end of the intervention, and final outcomes were collected during the close-out period between October 1, 2004 and March 31, 2005.

During the WHI, the WHI Steering Committee approved four substantial DM Trial protocol changes.

1. Revised the algorithm for calculating individualized fat gram goals (September 1995).
2. Eliminated the exclusion criterion of a BMI greater than 40 (March 1996).
3. Changed the dietary assessment method for the 4.3% subsample cohort from four-day food records to two-day 24-hour recalls (April 1997).
4. Increased the FFQ subsampling for year 2 and beyond from 10% annually to 33% annually (January 2000).